by *n* function;

phase comparator means for receiving said first frequency divided signal and said second frequency divided signal, and for producing a phase comparator signal responsive to said first and second frequency divided signals;

oscillator means for receiving said phase comparator signal, and for producing an output transmission signal having a frequency F_{OUT} responsive to said phase comparator signal such that $F_{OUT} = F_{LO}(1 \pm m/n)$; and

feedback circuitry coupled to said output transmission signal, coupled to said reference signal and coupled to said quadrature modulation means, said feedback circuitry for producing said feedback signal responsive to said output transmission signal and said reference signal.--

REMARKS

In the office action, claims 1, 4 - 10 and 13 - 19 were rejected under 35 U.S.C. §102 over German patent document EP 905879, and claims 2, 3, 11, 12 and 20 were rejected under 35 U.S.C. §103 over EP 905879 in view of U.S. Patent No 5,130,670.

Responsive to the office action, claims 1, 5, 7, 10, 14, 16, 18 and 19 have been amended and claims 4, 6, 13 and 15 have been cancelled.

The EP 905879 reference claims priority to German patent document DE 19743207. Applicant has enclosed for the examiner's convenience a copy of an English translation of DE 19743207. This reference discloses a transmitter circuit that includes quadrature input, a feedback path and a comparator that includes two

frequency dividers (FT1 and FT2).

The EP 905879 reference does not disclose the use of a reference signal having a frequency F_{LO} that equals the frequency of the output signal F_{OUT} divided by the sum of $1 \pm m/n$ where m and n represent frequency division values. Although EP 905879 includes two frequency dividers (1/N and 1/R) these frequency dividers are coupled to a phase frequency detector and a charge pump to provide a local oscillator frequency $F_{LO} = F_{VCO}/(R-N)$. The circuits disclosed in EP 90879 would not achieve the objectives of the invention of permitting optimal selection of m and n to provide dual band operation with reduced harmonic interference.

Applicant submits, therefore that each of claims 1 - 3, 5, 7 - 12, 14, and 16 - 20 is in condition for allowance. Favorable action consistent with the above is respectfully requested.

Respectfully submitted,

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Clean Copy of Amended Claims

1. A translation loop modulator for a transmission circuit in a communication system, said translation loop modulator comprising:

input modulation means for receiving at least one input signal that is representative of information to be modulated, for receiving a feedback signal, and for producing an intermediate modulated signal responsive to said input signal and said feedback signal;

comparator means for receiving said intermediate modulated signal and a reference signal having a frequency of F_{LO}, and for producing an output transmission signal having a frequency of F_{OUT} responsive to said intermediate modulated signal and said reference signal, wherein said comparator means includes a first frequency divider unit for providing a divide by m function and a second frequency divider unit for providing a divide by n function such that $F_{LO} = F_{OUT} / (1 \pm m/n)$ and

feedback circuitry coupled to said output transmission signal, coupled to said reference signal and coupled to said input modulation means, said feedback circuitry for producing said feedback signal responsive to said output transmission signal and said reference signal.

2. A translation loop modulator as claimed in claim 1 further comprising a reference loop modulator for producing said reference signal.

3. A translation loop modulator as claimed in claim 2, wherein said reference loop modulator includes a fractional n synthesizer.

5. A translation loop modulator as claimed in claim 1, wherein an input port of said second frequency divider unit is coupled to said reference signal, and an output port of said second frequency divider unit is coupled to a phase comparator device.

7. A translation loop modulator as claimed in claim 1, wherein an input port of said first frequency divider unit is coupled to said intermediate modulated signal, and an output port of said first frequency divider unit is coupled to a phase comparator device.

8. A translation loop modulator as claimed in claim 1, wherein said feedback circuitry includes a mixer device including a first input port coupled to said output transmission signal, a second input port coupled to said reference signal, and an output port coupled to said feedback signal.

9. A translation loop modulator as claimed in claim 8, wherein said reference signal is directly connected to said mixer device.

10. A translation loop modulator for a transmission circuit in a communication system, said translation loop modulator comprising:

quadrature modulation means for receiving at least one input signal that is representative of information to be modulated, for receiving a feedback signal, and for producing an quadrature modulated signal responsive to said input signal and said feedback signal;

phase comparator means for receiving said quadrature modulated signal and a reference signal having a frequency F_{LO}, and for producing a phase comparator signal responsive to said quadrature modulated signal and said reference signal, said phase comparator means including a first frequency divider unit for providing a divide by *m* function and a second frequency divider unit for providing a divide by *n* function;

oscillator means for receiving said phase comparator signal, and for producing an output transmission signal responsive to said phase comparator signal, said output transmission signal having a frequency F_{OUT} wherein $F_{OUT} = F_{LO}(1 \pm m/n)$; and

feedback circuitry coupled to said output transmission signal, coupled to said reference signal and coupled to said quadrature modulation means, said feedback circuitry for producing said feedback signal responsive to said output transmission signal and said reference signal.

11. A translation loop modulator as claimed in claim 10 further comprising a reference loop modulator for producing said reference signal.

12. A translation loop modulator as claimed in claim 11, wherein said reference loop modulator includes a fractional *n* synthesizer.

14. A translation loop modulator as claimed in claim 10, wherein an input port of said second frequency divider unit is coupled to said reference signal, and an output port of said second frequency divider unit is coupled to a phase comparator device.

16. A translation loop modulator as claimed in claim 10, wherein an input port of said first frequency divider unit is coupled to said intermediate modulated signal, and output port of said first frequency divider unit is coupled to a phase comparator device.

17. A translation loop modulator as claimed in claim 10, wherein said feedback circuitry includes a mixer device including a first input port coupled to said output transmission signal, a second input port coupled to said reference signal, and an output port coupled to said feedback signal.

18. A translation loop modulator as claimed in claim 17, wherein said reference signal is directly connected to said mixer device.

19. A translation loop modulator for a transmission circuit in a communication system, said translation loop modulator comprising:

quadrature modulation means for receiving at least one input signal that is representative of information to be modulated, for receiving a feedback signal, and for producing an quadrature modulated signal responsive to said input signal and said feedback signal;

first frequency divider means for receiving said quadrature modulated signal, and for producing a first frequency divided signal responsive to said quadrature modulated signal such that said first frequency divider means provides a divide by *m* function;

second frequency divider means for receiving a reference signal having a frequency F_{LO}, and for producing a second frequency divided signal responsive to said

reference signal such that said second frequency divider means provides a divide by n function;

phase comparator means for receiving said first frequency divided signal and said second frequency divided signal, and for producing a phase comparator signal responsive to said first and second frequency divided signals;

oscillator means for receiving said phase comparator signal, and for producing an output transmission signal having a frequency F_{OUT} responsive to said phase comparator signal such that $F_{OUT} = F_{LO}(1 \pm m/n)$; and

feedback circuitry coupled to said output transmission signal, coupled to said reference signal and coupled to said quadrature modulation means, said feedback circuitry for producing said feedback signal responsive to said output transmission signal and said reference signal.

20. A translation loop modulator as claimed in claim 19 further comprising a reference loop modulator for producing said reference signal.

Marked up Version of Claims

1. A translation loop modulator for a transmission circuit in a communication system, said translation loop modulator comprising:

input modulation means for receiving at least one input signal that is representative of information to be modulated, for receiving a feedback signal, and for producing an intermediate modulated signal responsive to said input signal and said feedback signal;

comparator means for receiving said intermediate modulated signal and a reference signal having a frequency of F_{LO}, and for producing an output transmission signal having a frequency of F_{OUT} responsive to said intermediate modulated signal and said reference signal, wherein said comparator means includes a first frequency divider unit for providing a divide by m function and a second frequency divider unit for providing a divide by n function such that $F_{LO} = F_{OUT} / (1 \pm m/n)$ and

feedback circuitry coupled to said output transmission signal, coupled to said reference signal and coupled to said input modulation means, said feedback circuitry for producing said feedback signal responsive to said output transmission signal and said reference signal.

2. A translation loop modulator as claimed in claim 1 further comprising a reference loop modulator for producing said reference signal.

3. A translation loop modulator as claimed in claim 2, wherein said reference loop modulator includes a fractional n synthesizer.

4. [~~A translation loop modulator as claimed in claim 1, wherein said comparator means includes at least one frequency divider unit including an input port for receiving a first signal having a first frequency, and an output port for producing a second signal responsive to said first signal, said second signal having a second frequency of a predetermined relationship to the frequency of said first signal.~~]

5. A translation loop modulator as claimed in claim [~~4~~] 1, wherein [~~said~~] an input port of said second frequency divider unit is coupled to said reference [~~unit~~] signal, and [~~said~~] an output port of said second frequency divider unit is coupled to a phase comparator device.

6. [~~A translation loop modulator as claimed in claim 4, wherein said comparator means includes a second frequency divider unit including an input port for receiving a first signal having a first frequency, and an output port for producing a second signal responsive to said first signal, said second signal having a second frequency of a predetermined relationship to the frequency of said first signal.~~]

7. A translation loop modulator as claimed in claim [~~6~~] 1, wherein [said] an input port of said first frequency divider unit is coupled to said intermediate modulated signal, and [said] an output port of said first frequency divider unit is coupled to a phase comparator device.

8. A translation loop modulator as claimed in claim 1, wherein said feedback circuitry includes a mixer device including a first input port coupled to said output transmission signal, a second input port coupled to said reference signal, and an output port coupled to said feedback signal.

9. A translation loop modulator as claimed in claim 8, wherein said reference signal is directly connected to said mixer device.

10. A translation loop modulator for a transmission circuit in a communication system, said translation loop modulator comprising:

quadrature modulation means for receiving at least one input signal that is representative of information to be modulated, for receiving a feedback signal, and for producing an quadrature modulated signal responsive to said input signal and said feedback signal;

phase comparator means for receiving said quadrature modulated signal and a reference signal having a frequency F_{LO}, and for producing a phase comparator signal responsive to said quadrature modulated signal and said reference signal, said phase comparator means including a first frequency divider unit for providing a divide by m function and a second frequency divider unit for providing a divide by n function;

oscillator means for receiving said phase comparator signal, and for producing an output transmission signal responsive to said phase comparator signal, said output transmission signal having a frequency F_{OUT} wherein $F_{OUT} = F_{LO}(1 \pm m/n)$; and

feedback circuitry coupled to said output transmission signal, coupled to said reference signal and coupled to said quadrature modulation means, said feedback circuitry for producing said feedback signal responsive to said output transmission signal and said reference signal.

11. A translation loop modulator as claimed in claim 10 further comprising a reference loop modulator for producing said reference signal.

12. A translation loop modulator as claimed in claim 11, wherein said reference loop modulator includes a fractional *n* synthesizer.

13. [~~A translation loop modulator as claimed in claim 10, wherein said comparator means includes at least one frequency divider unit including an input port for receiving a first signal having a first frequency, and an output port for producing a second signal responsive to said first signal, said second signal having a second frequency of a predetermined relationship to the frequency of said first signal.~~]

14. A translation loop modulator as claimed in claim [~~13~~] 10, wherein [~~said~~] an input port of said second frequency divider unit is coupled to said reference [~~unit~~] signal, and [~~said~~] an output port of said second frequency divider unit is coupled to a phase comparator device.

15. [~~A translation loop modulator as claimed in claim 13, wherein said comparator means includes a second frequency divider unit including an input port for receiving a first signal having a first frequency, and an output port for producing a second signal responsive to said first signal, said second signal having a second frequency of a predetermined relationship to the frequency of said first signal.~~]

16. A translation loop modulator as claimed in claim [~~15~~] 10, wherein [~~said~~] an input port of said first frequency divider unit is coupled to said intermediate modulated signal, and [~~said~~] output port of said first frequency divider unit is coupled to a phase comparator device.

17. A translation loop modulator as claimed in claim 10, wherein said feedback circuitry includes a mixer device including a first input port coupled to said output transmission signal, a second input port coupled to said reference signal, and an output port coupled to said feedback signal.

18. A translation loop modulator as claimed in claim [8] 17, wherein said reference signal is directly connected to said mixer device.

19. A translation loop modulator for a transmission circuit in a communication system, said translation loop modulator comprising:

quadrature modulation means for receiving at least one input signal that is representative of information to be modulated, for receiving a feedback signal, and for producing an quadrature modulated signal responsive to said input signal and said feedback signal;

first frequency divider means for receiving said quadrature modulated signal, and for producing a first frequency divided signal responsive to said quadrature modulated signal such that said first frequency divider means provides a divide by *m* function;

second frequency divider means for receiving a reference signal having a frequency F_{LO}, and for producing a second frequency divided signal responsive to said reference signal such that said second frequency divider means provides a divide by *n* function;

phase comparator means for receiving said first frequency divided signal and said second frequency divided signal, and for producing a phase comparator signal responsive to said first and second frequency divided signals;

oscillator means for receiving said phase comparator signal, and for producing an output transmission signal having a frequency F_{OUT} responsive to said phase comparator signal such that $F_{OUT} = F_{LO}(1 \pm m/n)$; and

feedback circuitry coupled to said output transmission signal, coupled to said reference signal and coupled to said quadrature modulation means, said feedback circuitry for producing said feedback signal responsive to said output transmission signal and said reference signal.

20. A translation loop modulator as claimed in claim 19 further comprising a reference loop modulator for producing said reference signal.